1U-Shelf Optical Amplifier User's Manual
(Erbium Doped Fiber Amplifier)

DKT COMEGA

Contents

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Figure Contents

Table Contents

1   INTRODUCTION

1.1   About this Manual

This manual is the Shelf Type EDFA of DKTCOMEGA A/S.

This manual consists of six sections.   They are; Introduction of the Shelf Type EDFA, System Requirements, Installation, Operation, Testing, and Trouble Shooting.   A brief chapter outline of this manual is below.

Chapter 1, The introduction of the Shelf Type EDFA and safety cautions for proper installation.
Chapter 2, How to install the Shelf Type EDFA.
Chapter 3, Panel description.
Chapter 4, Utilizing the LCD and Menu switch operation.
Chapter 5, Interface.
Chapter 6, EDFA Performance check method.
Chapter 7, Maintenance and repair.

1.2   General Descriptions

The Shelf Type EDFA operates in the range of 1550 nm wavelength.   The Pump Laser Diode is used as an Erbium Doped Fiber pumping energy source for the EDFA.   For better system performance isolators are installed on the input and output of the EDFA's optical terminals.   For convenient operation, SNMP, LED indicators, LCD, and Menu functions are assisted.   The Shelf Type EDFA is available in a variety of electrical power options such as AC (110V ~ 220V), DC (-48V).

1.3   Mechanical Dimensions and Operational Conditions

DKTCOMEGA's Shelf Type EDFA is installable in a 19" 1U Shelf.
The size is 432(W) × 304(D) × 44(H) mm.
The storage temperature must be kept between -40°C to 85°C.
The relative humidity range is 10~95%.
The operating temperature range is between 0°C to 50°C.
The LCD Backlight is assurance between -10°C to 60°C.
The electrical power consumption depends on the applied use of the EDFA.
For more information about electrical power consumption read the TEST REPORT.

1.4   Precautions for Installation and Warnings

The user must ensure there is air flow and convection through the upper and lower panels.

The Shelf Type EDFA has its own internal circuitry plus an internal electrical voltage converter.   Both generate heat.   Unrestricted air flow is required for proper operating conditions.

The optical adapters for the EDFA input and output are located on the front panel of the Shelf Type EDFA.   When received from the factory the optical adapters have a cap on them for safety and protection.   Until the Shelf is installed you need to leave the caps on. The operator/user must keep the surface of the optical connecter clean.   If the surface of the optical connecter is contaminated with dirt or obstructions the surface of the optical connecter may be damaged as soon as the Laser is turned on.

1.5   Grounding Considerations

The Shelf Type EDFA includes Laser Diodes and Photo Diodes those are extremely sensitive to electrical static.   You must always handle the EDFA with extra care.   When you unpack or install the EDFA you must obey all the ESD (electro static discharge) precautions as well as work with a grounded wrist strap.   Therefore, proper ESD precautions are always recommended.   To avoid performance degradation or loss of functionality, install in a properly grounded working shelf.   The F.G. terminal must be connected to Earth Ground for protection of the unit during installation and operation.
To protect the installation and to prevent unexpected accidents, such as lightning, static electricity, short circuit, surges, etc..., you must use a grounded receptacle for the AC power cord.
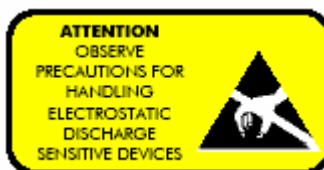
1.6   Laser Safety

FDA/CDRH Class IIIb and IEC® 60825 Class 3B laser product.
All versions are Class 3B laser products per IEC 60825-1:1993.

CAUTION : Use of controls, adjustment, and procedures other than those specified herein may result in hazardous laser radiation exposure.
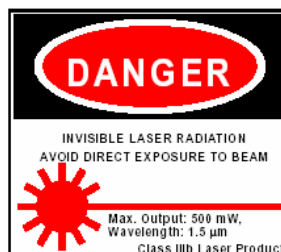
2   PREPARATION

2.1   Summary

In this chapter, the first steps of installation after unpacking are covered.   The box inventory, basic electrical and optical connections are presented.

2.2   Check the Contents

After unpacking you need to check the contents. The inventory should be as follows:

Table 1. The Inventory of Shelf Type EDFA

Item	Quantity	Remarks
Shelf Type EDFA Shelf	1	Including EDFA
Instructions manual	1 book	
TEST REPORT	1 booklet	

Inspect the outside of the EDFA.

WARNING: Remember to take all proper grounding precautions.

2.3   How to Connect the Power Supply

Figure 1 shows the electrical connectors with the input power terminals on the front panel of the Shelf Type EDFA.
The user must select the applicable power connections for their application and properly connect to the input power terminal.
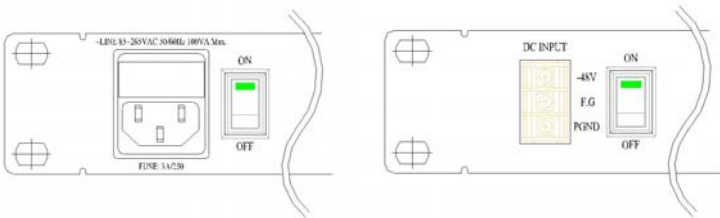
Figure 1. Electric Power Supply Connection

AC input voltage range: 85~265 VAC, 47~440 Hz
DC input voltage range: -36~-72V(for DC-48V)
Total power consumption: Refer to the TEST REPORT.

AC Power Supply: There is a fuse in the AC power socket.   After connecting the AC power cord to the unit, turn on the power switch on the front panel.   If the green LED on the power switch turns on, the system electric power supply is normal (OK).
If the green LED does not come on, you need to check the power-in cord and then the AC power fuse.

DC Power supply: When you connect DC power supply, handle it very carefully.   Make sure you connect the positive (+) and negative (-) connections properly, positive supply to the positive input and negative supply to the negative input.   If damage is caused by the user due to improper connections and the product does not work properly or malfunctions,

DKTCOMEGA is not liable for repairs or replacement of the unit. If the green LED on the power switch turns on, the system electric power supply is normal (OK).

2.4   How to connect the optical cable

The Shelf Type EDFA supports various optical connectors.
According to the users requirements connect the optical cable to the input and the output optical adapters on the front panel of the Shelf Type EDFA.

3 DESCRIPTION

3.1 Summary

In this chapter, general information about the front and rear panels of the Shelf type EDFA are explained. The individual switches and connections will be introduced.

3.2 Panel Description

3.2.1 Front Panel

Figure 2 shows the front panel of the Shelf Type EDFA. The components are: AC power inlet (optional a DC power terminal), a power switch with a power LED included, an LCD capable of 2×20 letters for reading the menu states, 4 menu control switches for selecting the LCD menus, a Laser ON/OFF key switch, an EDFA state indicating LED and optical adapter cassette.

(a)   Front Panel with AC Power inlet (Number of output port.: 1 to 8 ports)

(b) Front Panel with DC Power terminal (Number of output port.: 1 to 8 ports)
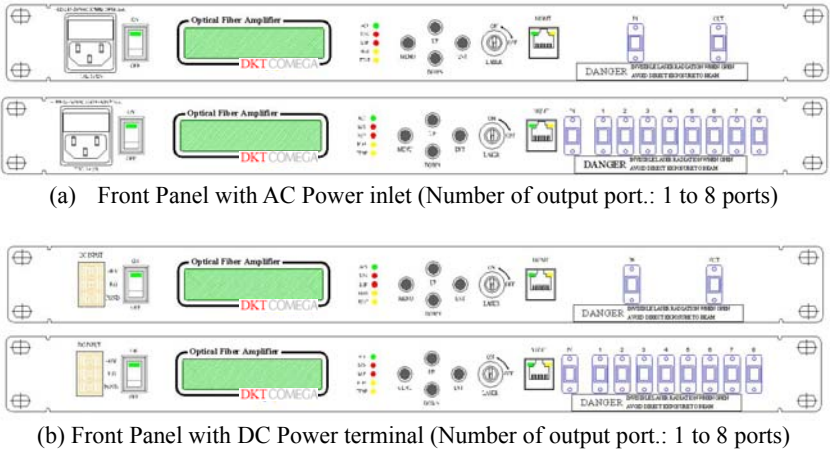
Figure 2. Front Panel

■   **Laser On/Off Key Switch**

Table 2. Laser On/OFF Key Switch

Conditions	Performance
ON	Operate EDFA normally
OFF	Forcefully turn off the EDFA output power

■   **Control Switch**

Table 3. Control Switch

Switch	Performance
MENU	Enter the menu or move the previous menu
ENTER	Apply the current menu
UP/DOWN	Move the menu items

■　**LED state on the front panel**

Table 4. LED State

Condition	Name	Color	Performance
Power Supply	POWER	Green	Power Supply indicator
EDFA	ACT	Green	Indicates EDFA install state and operation state
	LOS	Red	Indicates optical signal input state of the EDFA
	LOP	Red	Indicates optical signal output state of the EDFA
	BIAS	Yellow	Indicates Pump Laser Diode BIAS Alarm
	TEMP	Yellow	Indicates Pump Laser Diode Temperature Alarm

3.2.2　LED State Information

■　POWER LED
When an electric power is applied to the EDFA and the power switch is turned on, the POWER LED in the power switch turns on.

■　ACT LED
When the EDFA is properly installed, the ACT LED turns on.
However, if the Provision Menu is selected the DEACT state, the ACT LED turns off.

■　LOS (Loss of Signal) LED
When the input optical signal power to the EDFA is lower than the minimum input conditions, the LOS LED turns on (see the TEST REPORT). The threshold for triggering the loss of input signal alarm is set below the minimum optical input level. Commonly 3dB below the minimum input power level is set as the threshold.

If the LOS alarm is activated the EDFA automatically changes to the Laser Shutdown state, the output power is turned off, and the LOP LED turns on.

In response to a loss of input signal, the bias current of the pump laser diode goes into a shutdown state to prevent the development of dangerous laser diode operation conditions. If laser shutdown does not occur, the pump laser diode can be damaged.

This condition is automatically reset when the input power is restored to a power above the alarm threshold for the EDFA. The EDFA returns to its normal state, the LOS LED turns off, and the Laser ON state condition returns. If the output power of the EDFA is normal, the LOP LED turns off.

■　LOP(Loss of Output Power) LED
When the optical output power of the EDFA is lower than the reference power, the LOP LED turns on. (see the TEST REPORT) This level is commonly 3dB below the reference output power.

If the Laser OFF state is selected from the LCD menu, the LOP LED turns on.

The LOP alarm turns off when the output optical power of the EDFA is normal.

■　BIAS LED
The Pump Laser Diode provides pumping energy to the Erbium Doped Fiber in the EDFA. The pumping power of the Pump Laser Diode is controlled by applying a bias current. If the bias current of the pump laser diode is loaded above 95% of the end-of-life (EOL) value, the pump bias current alarm is activated. The EOL bias current is defined as 120% of the beginning-of-life (BOL) bias current. The pump laser diode driver is limited to never exceed the EOL bias level. This is an indicating LED for an over current condition of the Pump Laser Diode bias current.

If the BIAS alarm is activated the EDFA changes automatically to the Laser Shutdown state, the EDFA output power is turned off, and the LOP LED turns on.

■　TEMP LED

The internal temperature of the Pump Laser Diode must be kept constant.　If the internal temperature of the Pump Laser Diode goes outside of the operational range, the TEMP LED is activated.

If the TEMP alarm signal is activated the EDFA automatically changes to the Laser Shutdown state and the LOP LED is activated.

3.2.3　Rear Panel

The rear panel of the Shelf Type EDFA only consists of fan.

Figure 3. Rear Panel

4 OPERATION

4.1 Summary

In this chapter, the operation of the EDFA using the LCD menu will be explained. The diagram below shows the operational menu tree selectable.

MAIN MENU   **SUB MENU**

```
Menu
  ├── Provision ──┬── EDFA Act
  │               └── EDFA Deact
  │
  │                                       Laser Key Switch is "ON"
  ├── Control ──┬── LASER ──┬── Laser ON
  │             │           └── Laser OFF
  │             │
  │             └── Buzzer ──┬── Buzzer ON
  │                          └── Buzzer OFF
  │
  ├── Status ──┬── Input Power
  │            ├── Output Power
  │            ├── LD Bias
  │            ├── LD Thermistor
  │            ├── Case Temperature
  │            ├── Alarm
  │            └── EDFA Model
  │
  ├── Test ──── LED, Buzzer
  │
  └── Function Setting ──── Time
```
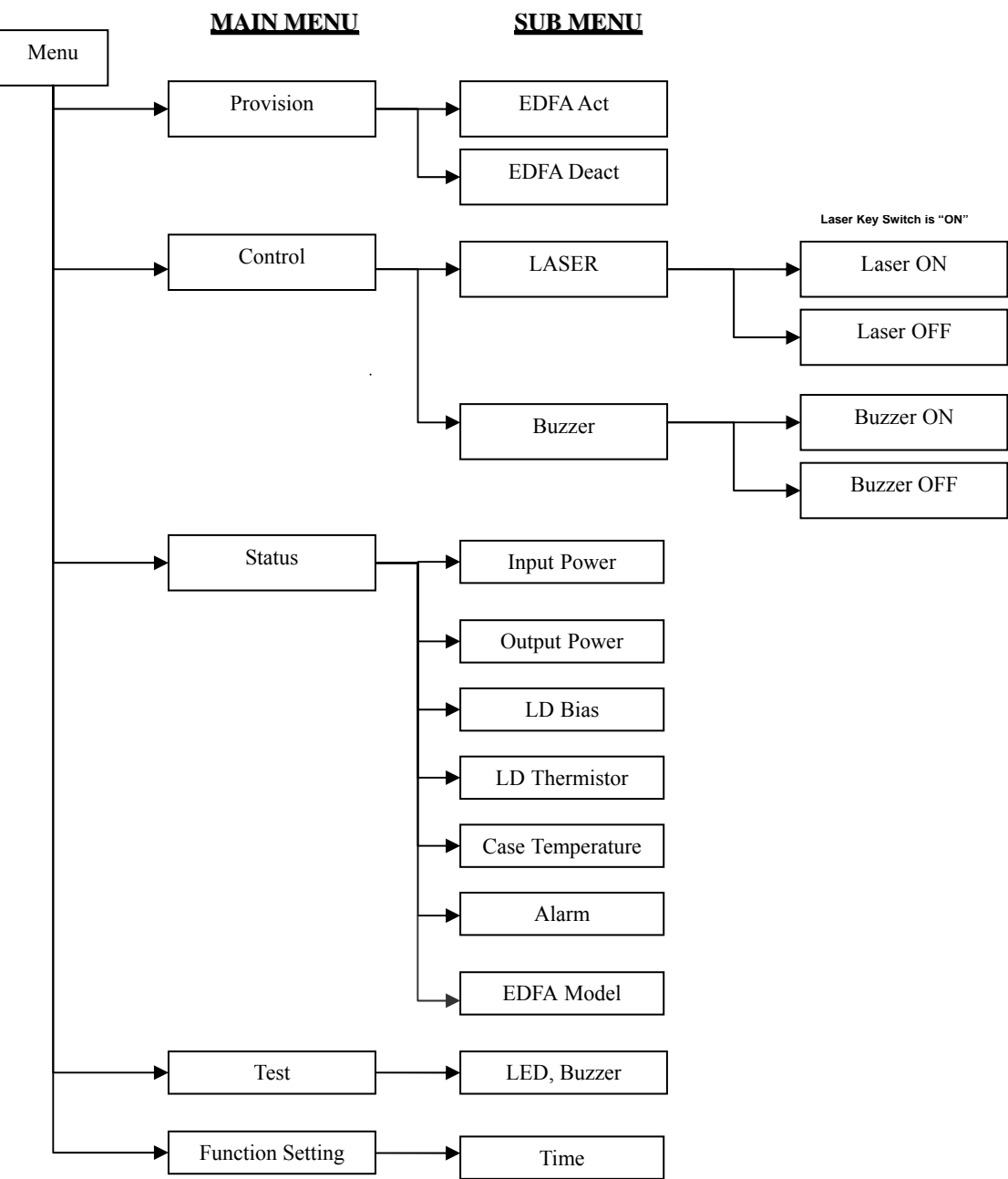
4.2   LCD Operation

The functions of the Shelf Type EDFA are supported by selecting the LCD Menu switch on the front panel.   If an electric power is applied, the initial display of the LCD display is as follows.

```
┌─────────────────────────┐
│     Optical Amplifier   │
│      Company Name       │
└─────────────────────────┘
```

WARNING: In all LCD menus if you do not select a menu switch for about 15 seconds, the menu automatically returns to the previous menu state.

4.2.1   Menu Selects

The main menu is Provision, Control, Status, Test, Function Setting.   You can select any menu by the Menu switch.

The procedure of selection in the MAIN MENU is as follows:

Push the Menu switch on the start screen.

The LCD display is changed to the next screen and then the cursor is on the "Provision" menu.

```
┌─────────────────────────┐
│  >    Provision         │
│       Control           │
└─────────────────────────┘
```

If you push the Down switch, the cursor moves to the "Control" menu.

```
┌─────────────────────────┐
│       Provision         │
│  >    Control           │
└─────────────────────────┘
```

With the cursor placed on the menu "Control", if you push the Down switch, the LCD screen changes and the cursor moves to the next menu, "Status".

```
┌─────────────────────────┐
│  >    Status            │
│       Test              │
└─────────────────────────┘
```
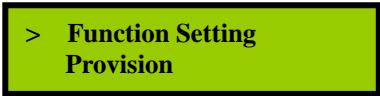
With the cursor on the menu "Status," push the Down switch, the cursor moves to the "Test" menu.

```
┌─────────────────────────┐
│       Status            │
│  >    Test              │
└─────────────────────────┘
```

From the above screen push the Down switch.

The cursor moves to the "Function Setting" menu, changing the LCD screen.

```
┌─────────────────────────┐
│  >    Function Setting  │
│       Provision         │
└─────────────────────────┘
```

In this condition MAIN MENU is finished.

DKT COMEGA

From the above screen if you push the Down switch, the start MAIN MENU screen is returned.

```
> Provision
  Control
```

4.2.2 Provision menu

User is able to control the operational state of the EDFA in the Provision menu. It is the menu for selecting active (ACT) and deactive (DEACT) operational states of the EDFA.

■   Provision menu

LCD display is changed to the next screen and then the cursor is on the "Provision" menu.

```
> Provision
  Control
```

From the cursor on the "Provision" if you push the Enter switch, the cursor moves from the Provision Menu to the SUB MENU.

```
EDFA            ACT
Setting         ACT
```

The first line of the above screen indicates the current state of the EDFA.

The initial state of the Provision menu depends on the setting state.

If you want to change the current state, move the cursor by the Up or Down switch to the menu you wish to select.

From the current state move the cursor by Up or Down switch to the position on the "DEACT" menu.

```
EDFA            ACT
Setting         DEACT
```

Push the Enter switch.

The LCD screen displays the operation selected above is complete.

```
Set & Store
 EDFA : DEACT
```

If you push Enter or Menu switch, the cursor moves to the "DEACT" menu. And if you do not select a menu switch for about 15 seconds, the menu automatically returns to the previous state and display.

After selecting the desired state, if you want to move to the MAIN MENU above on the screen you can change the menu with the Menu switch.

14

■　　Provision State Descriptions

Within the Provision menu the start state is the ACT (Active) state when the power is turned on.

If you select the DEACT state at the Provision Menu, the EDFA is working an normal operation except the alarm information.　The table shows the operational state of the EDFA at the Provision menu.

Table 5. Provision Menu Descriptions

ACT State	DEACT State
EDFA: normal operation	EDFA: normal operation Status LED: OFF (Alarm information is not detected)

4.2.3　Control

In the Control Menu, the optical output power of the EDFA can be controlled by Laser ON or Laser OFF.　Also you can select the Buzzer sound in the Buzzer Control menu.

From the MAIN MENU using the Menu switch move the cursor to the "Control".

```
      Provision
>     Control
```

If you push Enter switch, the cursor moves to the "LASER" menu.

■　　Laser ON

```
>    LASER
     BUZZER
```

From the below screen the first line indicates the current selected laser state of the EDFA.

If you want to select a different state from your current laser state, using the Up or Down switch, move the cursor to the menu that contains the state you wish to select.

```
Laser              Off
  Setting          On
```

To activate the output of the EDFA normally, put the cursor on the LASER ON position. Push the ENTER Switch (Laser Key switch is ON state).

```
Set & Store
  Laser : On
```

If the Laser Key switch is OFF state, Laser On/Off is not changed, it remains the same state.

```
Key switch
  Check Please..
```

Push Enter or Menu switch.

If you want to turn off the output of the EDFA, push the Enter switch to move the cursor to the "OFF" position.

```
Laser              Off
Setting            Off
```

In this state push the ENTER switch.

```
Set & Store
  Laser : Off
```

Note: When the Laser is selected the "Off", the output of the EDFA also turns off and the Laser LED turns off.

■   Buzzer ON

If an alarm has occurred on the EDFA, Buzzer sound is activated. You will hear a beeping sound. As soon as the alarm condition of the EDFA is removed, the Buzzer sound automatically stops.

```
      LASER
>    BUZZER
```

From the below screen the first line indicates the current selected buzzer state of the EDFA.

If you want to select a state different from your current buzzer state, using the Up or Down switch, move the cursor to the menu that contains the state you wish to select.

```
BUZZER             Off
 Setting            On
```

Push the ENTER switch

```
Set & Store
  BUZZER : ON
```

If you want to turn off the buzzer, push the Enter switch to move the cursor to the "OFF" position.

```
Buzzer              Off
Setting             Off
```

In this state push the ENTER switch.

```
Set & Store
  Buzzer : Off
```

When the Buzzer OFF is selected and the EDFA alarm is occurred, the Buzzer sound is not activated.

4.2.4 Status

In the Status menu you are able to monitor the operational state of the EDFA.

```
>  Status
   Test
```

If you push the Enter switch, the cursor moves to the "Input Power" menu. The Input Power is the optical input power.

```
>  Input Power
   Output Power
```

Input Power is displayed.

```
Input Power
            +XX.XX dBm
```

The Output Power is the EDFA output power monitoring.

```
   Input Power
>  Output Power
```

The LD Bias Current is the bias current of the pump laser diode.

```
>  LD Bias Current
   LD Thermistor
```

The unit of LD Bias Current is [mA].   The x of LDx is the number of used laser diode.

```
LD Bias Current
 LD1 :   XXXX mA
```

```
LD Bias Current
 LDx :   XXXX mA
```

17

The LD Thermistor is the pump laser diode temperature. The unit is centigrade [℃].

```
   LD Bias Current
>  LD Thermistor
```

```
LD Thermistor
  LD1 :    XX ℃
```

```
LD Thermistor
  LDx :    XX ℃
```

The Temperature is the EDFA module temperature. The unit is centigrade [℃].

```
>  Temperature
   Alarm Status
```

```
Temperature
          XX ℃
```

Using the Alarm menu you are able to check the EDFA Alarms.

```
   Temperature
>  Alarm Status
```

To move another alarm state, push Up/Down switch.

```
IPM : OK
OPM : OK
```

```
OPM : OK
BIAS : FAIL
```

Table 6. Alarm Descriptions

Name	Variable	Descriptions
IPM	Input Power Monitor	■ Shows the input optical signal power of the EDFA. OK: Normal, FAIL: Abnormal
OPM	Output Power	■ Shows the output optical power of the EDFA. OK: Normal, FAIL: Abnormal
BIAS	Monitor Current	■ Shows the state of the Pump Laser Diode Bias current. OK: Normal, FAIL: Abnormal
THER	Thermistor	■ Shows the temperature state of the Pump Laser Diode. OK: Normal, FAIL: Abnormal
TEMP	Case	■ Shows the temperature state of the EDFA module..

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	Temperature	OK: Normal, FAIL: Abnormal

EDFA Model Name is the EDFA model name of built in the Shelf.

> **> EDFA Model Name**
> **Input Power**

4.2.5 Test

From the Test menu you are able to test the LED, Buzzer.

> **Status**
> **> Test**

If you push the Enter switch, the cursor moves to the "LED Test" menu. In the LED Test menu the operating state of all the LEDs can be checked.

> **> LED Test**
> **Buzzer Test**

If you push the Down switch, the cursor moves to the "Buzzer Test" menu. Then if you push the Down switch, the operating state of the Buzzer can be checked.

> **LED Test**
> **> Buzzer Test**

4.2.6 Function Setting

The Function Setting menu is Time.

> **> Time**

The timer setting procedure for the internal timer is as follows:

> **> Current Time**
> **Setting Time**

In the below screen the Current Time indicates the present date and time.

> **YY YY MM DD HH MM SS**
> 2 0 0 4 06 09 15 05 30

In the Setting Time Menu, you can change the date and time to the values you need. Using the Up/Down, Enter switch move the cursor to the position that you want to change.

> **Current Time**
> **> Setting Time**

If you push the Down switch, the cursor moves to another position. And Up switch change the time value

```
YYYY MM DD HH MM SS
2 0 0 4  06  09  15  05  30
```

```
YYYY MM DD HH MM SS
2 0 0 5  06  09  15  05  30
```

If you push the Enter switch, the time value is stored.

5   INTERFACE

5.1   Command Line Interface (CLI)

User can monitor or control EDFA through Ethernet port or COM port.

ADMIN and USER accounts are established separately for different access priorities. ADMIN account holder can set passwords for both ADMIN and USER accounts. In addition, the task of administrative work, such as network connection, monitor and control of EDFA are to be performed under ADMIN account.

USER account holder, usually equipment operator, is allowed to monitor EDFA's current status.

5.1.1   Commands

Information on how to set arguments of each Command is provided after a Command followed by Enter key.

? : Show available Commands in CLI with description for user's reference.

ver: Display basic hardware information on EDFA.

cls: Clear the console screen.

ping: Check connection of equipment to which an IP address is assigned.

logout : Log out from ADMIN or USER account. Not available for Telnet connection.

ip: **IP address.**   Key information for Telnet, SNMP, or TCP/IP connection.

subnetmask: **Subnetmask address.** Key information for Telnet, SNMP, or TCP/IP connection.

gateway: **Gateway address.** Key information for Telnet, SNMP, or TCP/IP connection.

initsys:

reset: Reset to factory default setup. Reset the network connection due to network reconfiguration or any other network connection problems. Operation of optical amplifier is not affected by this command.

mpu : Main Process Unit configuration as well as setup view and confirmation.

ofau : OFAU (Optical Fiber Amplifier Unit, amplifier module in side shelf-type EDFA or amplifier module card for rack-type EDFA) configuration as well as setup view and confirmation.

snmp : SNMP configuration as well as setup view and confirmation.

log : Check log information and eliminate log. Log information can only be eliminated through console.

timesync : Manually update RTC (Real Time Clock).

Command Execution Privilege		
command	ADMIN	USER
ver	O	O
cls	O	O

ping	O	O
logout	O	O
ip	Read/Write	Read Only
subnetmask	Read/Write	Read Only
gateway	Read/Write	Read Only
initsys	O	X
reset	O	O
mpu	Read/Write	Read Only
otu	Read/Write	Read Only
ofau	Read/Write	Read Only
snmp	Read/Write	Read Only
log	Read/Write	Read Only
timesync	O	X

5.1.1.1   VER
Software version information.
ex)

```
[ADMIN]# VER
+-------------------------------------------+
| Otical Amplifier Shelf System             |
| Debug Console Mode                        |
|                                           |
|                       SNMP Board ver 1.0  |
|                                           |
| S/W Ver : 01.00.00.00    Update : 2006/12/11  |
+-------------------------------------------+
```

5.1.1.2   CLS
Clear console screen.

5.1.1.3   PING
Confirm IP address to see if the IP address is assigned to any physical device.
ex)

```
[ADMIN]# PING 192.168.0.1
192.168.0.1 is alive.
```

5.1.1.4   LOGOUT
Log out from RS-232 interface. Not applicable for SNMP connection.
5.1.1.5   IP
View or set up IP Address. Avoid IP address collision by using a unique IP address.
5.1.1.6   SUBNETMASK
View or set up SubnetMask Address. Check network connection configuration before set up.
5.1.1.7   GATEWAY
View or set up Gateway Address. Confirm Gateway address of connected network before set up.
5.1.1.8   INITSYS
Initialize the product with factory default setup. Note that all the configurations, including log
information, are to be initialized.
5.1.1.9   RESET
Reset network connections for configuration change or any other needs for connection reset.
OFAU operation is not affected by this command. Only network connection is to be reset.

5.1.1.10 MPU

22

Check MPU information and status of physical devices connected the MPU. In addition, basic set up of MPU is possible. See below for examples.

ex)

```
Usage : MPU [ARG1] [ARG2] [ARG3]
ARG1    : GET, SET
ARG2    : GET - SYSINFO
                 STATUS
           SET - TIME
                 DESCR
ARG3    : TIME - Set New Time. [YYYYMMDDhhmmss]
           DESCR - Enter User define string.[Len:0 ~ 20]
```

MPU SET DESCR [Len : 0 ~20]: Input MPU Description
   ex) MPU SET DESCR Shelf-OFA for Node 1

MPU SET TIME [YYYYMMDDhhmmss] : Input time information for MPU. Use 14 digits to input the time information, such as [YYYYMMDDhhmmss].
   ex) MPU SET TIME 20061207091830

MPU GET SYSINFO : View MPU Model Name, Description, Serial Number, Firmware Version, Hardware Version.

ex)

```
[ADMIN]# MPU GET SYSINFO
-------------------------------------------------
 Model Name : EDFA-21-220-SA-04
 Description : DKTCOMEGA EDFA
 Serial Number : 0000
 Firmware Version : 1.00
 Hardware    Version : 1.00
-------------------------------------------------
```

MPU GET_STATUS : View MPU time information.

ex)

```
[ADMIN]# MPU GET STATUS
-------------------------------------------------
 Current Time (Bit) : 2006/12/07 11:48:34
 Provision (Bit) : 0x1
 Card ACT (Bit) : 0x1
 Card Alarm (Bit) : 0x0
-------------------------------------------------
```

5.1.1.11 OFAU

Check information on OFAU and its status. In addition, basic set up of OFAU is possible. See below for examples.

ex)

```
Usage : OFAU [ARG1] [ARG2] [ARG3] [ARG4]
ARG1    : GET, SET
ARG2    : GET - SYSINFO. OFAU Model Information.
                 STATUS. OFAU Module Status.
                 CONFIG. OFAU Module Configuration Data.
           SET - AOL. Alarm Of Loss Input Power. (Rack type only)
                 REF. Reference Output Power. (Rack type only)

ARG3    : Slot Number Value. [1 ~ 10]. (if absent, monitor whole OFAU slot)
ARG4    : SET - AOL. Unit[0.1 dBm] (Input Power Min ~ Input Power Max)
                 REF. Unit[0.1 dBm] (Output Power Min ~ Output Power Max)
```

OFAU SET AOL [Input Power Min ~ Input Power Max] :   Define threshold input power value for Alarm Of Loss Input Power (Rack type EDFAs only)

OFAU SET REF [Output Power Min ~ Output Power Max] : Define Reference Output
Power (Rack type EDFAs only)

OFAU GET SYSINFO – View OFAU module basic Information

ex)

```
[ADMIN]# OFAU GET SYSINFO
-------------------------------------------------
 OFAU Slot Number [0]
 Model Name : 21-220-SA-04
 Description : DKTCOMEGA
 Serial Number : 200604130001
 Firmware Version : 1.00
 Hardware   Version : 1.00

-------------------------------------------------
```

OFAU GET STATUS – View OFAU current status.

ex)

```
[ADMIN]# OFAU GET STATUS
-------------------------------------------------
 OFAU Slot Number [0]
 EDFA Alarm Status (Bit) : 0x0
 Operation Mode : 30
 Case Temp. : 43 ['C]
 +5V :    5.0 [V]
 Input Power :    0.7 [dBm]
 Output Power :   14.8 [dBm]
 Laser Alarm Status (Bit) : 0
 LD[1] Bias : 180 [mA]        LD[1] Temp. : 25 ['C]
 LD[2] Bias : 217 [mA]        LD[2] Temp. : 25 ['C]
 LD[3] Bias : 408 [mA]        LD[3] Temp. : 25 ['C]

-------------------------------------------------
```

OFAU GET CONFIG – View OFAU configuration.

ex)

```
[ADMIN]# OFAU GET CONFIG
-------------------------------------------------
 OFAU Slot Number [0]
 +5V Low Limit :    4.7 [V]
 +5V High Limit :    5.3 [V]
 Input Power Minimum : -16.2 [dBm]
 Input Power Maximum :    7.1 [dBm]
 Output Power Minimum :   -3.9 [dBm]
 Output Power Maximum :   19.0 [dBm]
 Alarm Of Loss Power Limit :    0.0 [dBm]
 Reference Output Power Limit :   14.8 [dBm]
 LD[1] Bias Current Maximum :    415 [mA]
 LD[2] Bias Current Maximum :    661 [mA]
 LD[3] Bias Current Maximum :   1000 [mA]

-------------------------------------------------
```

5.1.1.12 SNMP

Before SNMP interface connection, a few preliminary setups need to be done. SNMP interface
requires Read Only Community and Read Write Community to be set up. For Trap set up, Trap
IP, Trap Community, and Trap Enable/Disable need to be defined beforehand. See below for
examples.

DKT COMEGA

ex)

```
Usage : SNMP [ARG0] [ARG1] [ARG2] [ARG3]
ARG0   : TRAP , ROCOMM, RWCOMM, TRAPEN, TRAPCOMM
ARG1   : GET , SET
ARG2   : GET   - TRAP : Trap Receiver Index. (0 ~ 4)
                - ROCOMM : Read Only Community. Max StrLen 10
                - RWCOMM : Read Write Community. Max StrLen 10
                - TRAPEN : Trap Receiver Index. (0 ~ 4)
                - TRAPCOMM : Trap Receiver Index. (0 ~ 4)
         SET   - TRAP : Trap Receiver Index. (0 ~ 4)
                - ROCOMM : Read Only Community. Max StrLen 10
                - RWCOMM : Read Write Community. Max StrLen 10
                - TRAPEN : Trap Receiver Index. (0 ~ 4)
                - TRAPCOMM : Trap Receiver Index. (0 ~ 4)
ARG3   : SET   - TRAP : Manager IP. [XXX.XXX.XXX.XXX]
                - TRAPEN : ON, OFF
                - TRAPCOMM : Community Public. Max StrLen 10
```

SNMP GET TRAP [Index]
　ex)

```
[ADMIN]# SNMP GET TRAP 1
SNMP Trap Receiver[1] IP : 192.168.0.52
```

SNMP GET ROCOMM
　ex)

```
[ADMIN]# SNMP GET ROCOMM
SNMP Read Only Community : public
```

SNMP GET RWCOMM
　ex)

```
[ADMIN]# SNMP GET RWCOMM
SNMP Read Write Community : PRIVATE
```

SNMP GET TRAPEN [Index]
　ex)

```
[ADMIN]# SNMP GET TRAPEN 1
SNMP Trap Receiver-[1] State : OFF[0]
```

SNMP GET TRAPCOMM [Index]
　ex)

```
[ADMIN]# SNMP GET TRAPCOMM 1
SNMP Trap Receiver-[1] Trap Community : public
```

SNMP SET ROCOMM [string]
　ex)

```
[ADMIN]# SNMP SET ROCOMM PUBLIC
SNMP Community public : PUBLIC setting success.
This setting will be applied after reboot.
```

SNMP SET RWCOMM [string]
　ex)

```
[ADMIN]# SNMP SET RWCOMM PUBLIC
SNMP Community public : PRIVATE setting success.
This setting will be applied after reboot.
```

SNMP SET TRAPEN [Index] [ON/OFF]
　ex)

```
[ADMIN]# SNMP SET TRAPEN 1 ON
SNMP Trap[1] Enable Setting Successful...
```

SNMP SET TRAPCOMM [Index] [string]
　ex)

DKT COMEGA

25

```
[ADMIN]# SNMP SET TRAPCOMM 1 public
SNMP Trap Receiver[1] Trap Community : public setting success.
This setting will be applied after reboot.
```

5.1.2   Network Configuration

User needs to set up network configuration for the product.

Factory default IP address is 192.168.0.100. Network configuration is to be modified by either SNMP or Telnet. The modified configuration is enacted by reboot. The reset command of CLI also allows the modified configuration to be enacted.

If information on modified configuration is forgotten, then use the console to check or reset IP address. Note that network configuration can be set only by ADMIN account.

Factory Default

Item	Default Value
IP	192.168.0.100
SubnetMask	255.255.255.0
Gateway	192.168.0.1

5.1.3   SNMP Configuration

This unit supports SNMPv1, SNMPv2, and SNMPv2c. SNMPv3 will not be supported until next software upgrades. Using MIB Table for SNMP interface, GUI (Graphic User Interface) can be established for remote control and monitoring.

Read Only Community: Accounts for general users like operators who are not allowed to modify configurations. Identical to USER account in CLI.

Read/Write Community: Accounts for system administrators, who can modify product configurations. Identical to ADMIN in CLI

Trap IP: IP address for Trap Receiver which receives alarm information in an event of alarm activation. Up to 5 Trap IP can be assigned.

Trap Enable: Enable alarm transmission to Trap IP. Assign Trap IP before Trap Enable

Trap Community: The community name to be used by the device when sending traps.

Factory Default

Item	sub-command	Default Value
RO community	ROCOMM	PUBLIC
RW community	RWCOMM	PRIVATE
Trap IP	TRAP	0.0.0.0
Trap Enable	TRAPEN	OFF

5.2   SNMP MIB Table

5.2.1   networkGrp

DKTCOMEGA System MIB : 1.3.6.1.4.1.25454.1				
Name	OID	Type	Access	Factory Default
networkIpAddr	2.1	IpAddress	R/W	192.168.0.100
networkSubnetAddr	2.2	IpAddress	R/W	255.255.255.0
networkGWYAddr	2.3	IpAddress	R/W	192.168.0.1

- networkIpAddr : Network IP address

- networkSubnetAddr : Subnet Mask Address

- networkGWYAddr : Gateway Address

5.2.2   snmpGrp

DKTCOMEGA System MIB : 1.3.6.4.1.25454.1				
Name	OID	Type	Access	Factory Default
snmpVer	3.1	Integer32	R/W	1
snmpRoComm	3.2	DisplayString	R/W	PUBLIC
snmpRwComm	3.3	DisplayString	WO	PRIVATE
snmpAdminAuthType	3.4	Integer32	R/W	0
snmpUserAuthType	3.5	Integer32	R/W	0
snmpTrapMgmtTable	3.8	SEQUENCE OF SnmpTrapMgmtEntry		--
snmpTrapMgmtEntry	3.8.1.1	SnmpTrapMgmtEntry		--
snmpTrapIndex	3.8.1.1.1	Integer32	RO	--
snmpTrapIp	3.8.1.1.2	IpAddress	R/W	--
snmpTrapComm	3.8.1.1.3	DisplayString	R/W	--
snmpTrapEnable	3.8.1.1.4	Integer32	R/W	--

- snmpVer : SNMP version.

```
0 : no action
1 : SNMPv1, SNMPv2
2 : SNMPv3
3 : SNMPv1, SNMPv2, SNMPv3
```

- snmpRoComm: Community for Read Only in SNMPv1, SNMPv2, SNMPv2.

- snmpRwComm: Community for Read and Write in SNMPv1, SNMPv2, SNMPv2.

- snmpAdminAuthType: Determine SNMPv3 protocol (MD5 or SHA1) by ADMIN. (Not available until SNMPv3 is supported)

```
0 : none
1 : MD5
2 : SHA1
```

- snmpUserAuthType: Determine SNMPv3 protocol (MD5 or SHA1) by USER. (Not available until SNMPv3 is supported)

```
0 : none
1 : MD5
2 : SHA1
```

DKTCOMEGA

- snmpTrapMgmtTable : Table for SNMP Trap management

- snmpTrapMgmtEntry : List for SNMP Trap management

- snmpTrapIndex : Trap Row Data index

- snmpTrapIp : Set up IP address for Trap Receiver. 0.0.0.0 will remove IP address and disable Trap Receiver feature.

- snmpTrapComm : Specify SNMP trap community information.

- snmpTrapEnable : Enable or disable SNMP Trap.

5.2.3 logGrp

DKTCOMEGA System MIB : 1.3.6.4.1.25454.1				
Name	OID	Type	Access	비 고
logTable	4.1	SEQUENCE OF LogEntry		
logEntry	4.1.1	LogEntry		
logIndex	4.1.1.1	Integer32	RO	
logDate	4.1.1.2	DisplayString	RO	
logData	4.1.1.3	DisplayString	RO	
logType	4.1.1.4	Integer32	RO	
logDescr	4.1.1.5	DisplayString	RO	

- logTable: Table for system log management

- logEntry: List of system log.

- logIndex : Log Index up to 200 events. The oldest log stored at the top.

- logDate : Time info for log in a format of YYYY/MM/DD hh:mm:ss.

- logData : Data information for log.

- logType : Type of log.

logType	Type	Description
0	System	Log for system status
1	Device	Log for device status change
2	Alarm	Log for alarm occurrence

- logDescr : Log description.

5.2.4 Mpu MIB Tables

DKTCOMEGA Product MIB : 1.3.6.4.1.25454.51.1			
Name	OID	Type	Access
mpuModelName	1.1	DisplayString	RO
mpuDescr	1.2	DisplayString	R/W
mpuSerialNumber	1.3	DisplayString	RO
mpuFWRev	1.4	DisplayString	RO
mpuHWRev	1.5	DisplayString	RO
mpuSysUpTime	1.6	DisplayString	R/W
mpuVoltLowSet	2.1	Integer32	RO
mpuVoltHighSet	2.2	Integer32	RO
mpuVoltValue	3.1	Integer32	RO
mpuVccLowAlarm	3.2	Integer32	RO

mpuVccHighAlarm	3.3	Integer32	RO
mpuCardStatusTable	3.4	SEQUENCE OF MpuCardStatusEntry	
mpuCardStatusEntry	3.4.1	MpuCardStatusEntry	
mpuCardIndex	3.4.1.1	Integer32	RO
mpuCardIdentity	3.4.1.2	DisplayString	RO
mpuCardProvision	3.4.1.3	Integer32	R/W
mpuCardActiveState	3.4.1.4	Integer32	RO
mpuCardFailAlarm	3.4.1.5	Integer32	RO
mpuCardOperStatus	3.4.1.6	Integer32	RO
mpuCardAdminStatus	3.4.1.7	Integer32	R/W

- mpuModelName : Model Name of MPU.

- mpuDescr : Description of MPU that user can specify.

- mpuSerialNumber : MPU Serial Number.

- mpuFWRev : MPU Firmware Version.

- mpuHWRev : MPU Hardware Version.

- mpuSysUpTime : RTC of MPU in "YYYY/MM/DD hh:mm:ss" format.

- mpuVoltLowSet : Threshold voltage for mpuVccLowAlarm in unit of 0.1V.

- mpuVoltHighSet : Threshold voltage for mpuVccHighAlarm in unit of 0.1V.

- mpuVoltValue : Voltage measured at MPU in unit of 0.1V.

- mpuVccLowAlarm : Low voltage alarm information when mpuVoltValue is less than

                 mpuVoltLowSet.

- mpuVccHighAlarm : High voltage alarm information when mpuVoltValue is higher than

                 mpuVoltHighSet.

- mpuCardStatusTable : Table for information of circuit boards (CARD) managed by MPU.

- mpuCardStatusEntry : List of CARD information

- mpuCardIndex : Slot number for the CARDs.

- mpuCardIdentity : CARD ID number

```
0 : NULL (No Cards)
1 : PSU (Power Supply Unit)
2 : OTU (Optical Transmitter Unit, not available for shelf type EDFAs)
3 : OFAU (Optical Fiber Amplifier Unit)
```

- mpuCardProvision : CARD alarm masking information. If a particular CARD's

    mpuCardProvision is set to be '1', alarm information is not communicated to MPU.

- mpuCardActiveState : CARD connection information. If CARD is in place, "1" is
assigned. In a shelf type EDFA, it is always "1" since each CARD can not be
detached from the slot.

- mpuCardFailAlarm : CARD alarm information. Activated until alarm for each and every
CARD inside the product is cleared.

- mpuCardOperStatus : CARD operation monitoring.

- mpuCardAdminStatus : CARD operation control and monitoring.

5.2.5 ofau MIB Tables

```
DKTCOMEGA Product MIB : 1.3.6.4.1.25454.51.3
```

Name	OID	Type	Access	Note
ofauMgmtTable	1.1	SEQUENCE OF OfauMgmtEntry		
ofauConfTable	2.1	SEQUENCE OF OfauConfEntry		
ofauEdfaStatusTable	3.1	SEQUENCE OF OfauEdfaStatusEntry		
ofauLaserStateTable	3.2	SEQUENCE OF OfauLaserStateEntry		
ofauAlarmTable	3.3	SEQUENCE OF OfauAlarmEntry		
ofauLaserAlarmTable	3.4	SEQUENCE OF OfauLaserAlarmEntry		

5.2.5.1 ofauMgmtTable

- ofauMgmtTable : Table for OFAU management and configuration information.

Name	OID	Type	Access	Note
ofauMgmtTable	1.1	SEQUENCE OF OfauMgmtEntry		
ofauMgmtEntry	1.1.1	OfauMgmtEntry		
ofauMgmtIndex	1.1.1.1	Integer32	RO	
ofauMgmtModelName	1.1.1.2	DisplayString	RO	
ofauMgmtDescr	1.1.1.3	DisplayString	RO	
ofauMgmtSerialNumber	1.1.1.4	DisplayString	RO	
ofauMgmtFWRev	1.1.1.5	DisplayString	RO	
ofauMgmtHWRev	1.1.1.6	DisplayString	RO	
ofauMgmtLedTest	1.1.1.7	Integer32	R/W	
ofauMgmtLaserOn	1.1.1.8	Integer32	R/W	
ofauMgmtAlarmLossInPwr	1.1.1.9	Integer32	R/W	
ofauMgmtRefOutPwr	1.1.1.10	Integer32	R/W	

- ofauMgmtEntry : List of OFAU management information.

- ofauMgmtIndex : Slot number for OFAU. In shelf type OFA, it is always '1'.

- ofauMgmtModelName : OFAU Model Name.

- ofauMgmtDescr : OFAU description.

- ofauMgmtSerialNumber : OFAU Serial number.

- ofauMgmtFWRev : OFAU Firmware Version.

- ofauMgmtHWRev : OFAU Hardware Version

- ofauMgmtLedTest : Test LED for OFAU (Rack type) or MPU (Shelf type).

Value	Operation
1	Switch on and off the LED five times for 1 second duration. Reset ofauMgmtLedTest value to '0' after the test.

- ofauMgmtLaserOn : Switch on or off pump LDs in OFAU.

Value	Laser Control
30	APC (Automatic Power Control), turn on and maintain LD power level.
40	ALS (Automatic Laser Shutdown), turn off LDs.

- ofauMgmtAlarmLossInPwr: Threshold input power level for Input Power Alarm activation, in unit of 0.1 dBm.

- ofauMgmtRefOutPwr : Threshold output power level for Output Power Alarm activation, in unit of 0.1 dBm.

5.2.5.2 ofauConfTable

- ofauConfTable : Table for minimum and maximum values for parameters of OFAU.

Name	OID	Type	Access	Note
ofauConfTable	2.1	SEQUENCE OF OfauConfEntry		
ofauConfEntry	2.1.1	OfauConfEntry		
ofauConfInPwrMin	2.1.1.1	Integer32	RO	
ofauConfInPwrMax	2.1.1.2	Integer32	RO	
ofauConfOutPwrMin	2.1.1.3	Integer32	RO	
ofauConfOutPwrMax	2.1.1.4	Integer32	RO	
ofauConfReflOutPwrMin	2.1.1.5	Integer32	RO	
ofauConfReflOutPwrMax	2.1.1.6	Integer32	RO	
ofauConfVccLow	2.1.1.7	Integer32	RO	
ofauConfVccHigh	2.1.1.8	Integer32	RO	

- ofauConfEntry : List of OFAU configuration parameters

- ofauConfInPwrMin : OFAU Input Power Minimum value, in unit of 0.1 dBm.

- ofauConfInPwrMax : OFAU Input Power Maximum value, in unit of 0.1 dBm.

- ofauConfOutPwrMin : OFAU Output Power Minimum value, in unit of 0.1 dBm.

- ofauConfOutPwrMax : OFAU Output Power Maximum value, in unit of 0.1 dBm.

- ofauConfReflOutPwrMin : OFAU Reflected Output Power Minimum value, in unit of 0.1dBm. Subject to ofauEdfaStatusUnitOpt setup.

- ofauConfReflOutPwrMax : OFAU Reflected Output Power Maximum value, in unit of 0.1dBm. Subject to ofauEdfaStatusUnitOpt setup.

- ofauConfVccLow : OFAU Vcc Low Limit value, in unit of 0.1 V.

- ofauConfVccHigh : OFAU Vcc High Limit value, in unit of 0.1 V.

5.2.5.3 ofauEdfaStatusTable

- ofauEdfaStatusTable :   Table for OFAU status management.

Name	OID	Type	Access	Note
ofauEdfaStatusTable	3.1	SEQUENCE OF OfauEdfaStatusEntry		
ofauEdfaStatusEntry	3.1.1	OfauEdfaStatusEntry		
ofauEdfaStatusUnitOpt	3.1.1.1	Integer32	RO	
ofauEdfaStatusAlarmStatus	3.1.1.2	Integer32	RO	
ofauEdfaStatusOperMode	3.1.1.3	Integer32	RO	
ofauEdfaStatusCaseTemp	3.1.1.4	Integer32	RO	
ofauEdfaStatusVcc	3.1.1.5	Integer32	RO	
ofauEdfaStatusInPwr	3.1.1.6	Integer32	RO	

ofauEdfaStatusOutPwr	3.1.1.7	Integer32	RO	
ofauEdfaStatusReflOutPwr	3.1.1.8	Integer32	RO	

- ofauEdfaStatusEntry : List of OFAU status information.

- ofauEdfaStatusUnitOpt : OFAU Reflected Output Power enable/disable.

ofauEdfaStatusUnitOpt Value	Reflected Output Power
0	Disable
1	Enable

- ofauEdfaStatusAlarmStatus : OFAU alarm information.

Bit	Description
0	P5V Low
1	P5V High
2	Case Temperature
3	Input Power
4	Output Power
5	Reflected Output Power (Option 1)

- ofauEdfaStatusOperMode : OFAU Operation Mode.

Operation Mode	Value	Description
APC	30	Automatic constant power control mode.
ALS	40	Automatic laser shutdown by user.
APC ALS	43	Automatic laser shutdown by APC alarm.
AGC ALS	42	Automatic laser shutdown by AGC (Automatic Gain Control) alarm.
Key ALS	44	Automatic laser shutdown by key switch
AGC	20	Automatic constant gain control mode.

- ofauEdfaStatusCaseTemp : OFAU Case Temperature, in unit of °C.

- ofauEdfaStatusVcc : OFAU Vcc, in unit of 0.1 V.

- ofauEdfaStatusInPwr : OFAU Input Power, in unit of 0.1 dBm.

- ofauEdfaStatusOutPwr : OFAU Output Power, in unit of 0.1 dBm.

- ofauEdfaStatusReflOutPwr: OFAU Reflect Output Power, in unit of 0.1dBm. Subject to
   ofauEdfaStatusUnitOpt setup.

5.2.5.4 ofauLaserStateTable

- ofauLaserStateTable : Table for OFAU Laser (or Pump LDs) management.

Name	OID	Type	Access	Note
ofauLaserStateTable	3.2	SEQUENCE OF OfauLaserStateEntry		
ofauLaserStateEntry	3.2.1	OfauLaserStateEntry		
ofauLaserStateLDIndex	3.2.1.1	Integer32	RO	
ofauLaserStateLDBias	3.2.1.2	Integer32	RO	
ofauLaserStateLDTemp	3.2.1.3	Integer32	RO	

DKT COMEGA

ofauLaserStateLDBiasCurMax	3.2.1.4	Integer32	RO	

- ofauLaserStateEntry : List of OFAU Laser status information.

- ofauLaserStateLDIndex : OFAU Laser index

- ofauLaserStateLDBias : OFAU LD Bias, in unit of mA

- ofauLaserStateLDTemp : OFAU LD Temperature, in unit of °C.

- ofauLaserStateLDBiasCurMax : OFAU LD Bias Current Maximum, in unit of mA

5.2.5.5 ofauAlarmTable

- ofauAlarmTable : Table for OFAU alarm.

Name	OID	Type	Access	Note
ofauAlarmTable	3.3	SEQUENCE OF OfauAlarmEntry		
ofauAlarmEntry	3.3.1	OfauAlarmEntry		
ofauAlarmVccLow	3.3.1.1	Integer32	RO	
ofauAlarmVccHigh	3.3.1.2	Integer32	RO	
ofauAlarmCaseTemp	3.3.1.3	Integer32	RO	
ofauAlarmInPwr	3.3.1.4	Integer32	RO	
ofauAlarmOutPwr	3.3.1.5	Integer32	RO	
ofauAlarmReflOutPwr	3.3.1.6	Integer32	RO	

- ofauAlarmEntry : List of OFA alarm.

- ofauAlarmVccLow : OFAU Vcc Low Alarm.

- ofauAlarmVccHigh : OFAU Vcc High Alarm.

- ofauAlarmCaseTemp : OFAU Case Temp Alarm.

- ofauAlarmInPwr : OFAU Input Power Alarm.

- ofauAlarmOutPwr : OFAU Output Power Alarm.

- ofauAlarmReflOutPwr : OFAU Reflected Output Power Alarm

5.2.5.6 ofauLaserAlarmTable

- ofauLaserAlarmTable : Table for OFAU Laser Alarm.

Name	OID	Type	Access	Note
ofauLaserAlarmTable	3.4	SEQUENCE OF OfauLaserAlarmEntry		
ofauLaserAlarmEntry	3.4.1	OfauLaserAlarmEntry		
ofauLaserAlarmLDBias	3.4.1.1	Integer32	RO	
ofauLaserAlarmLDTemp	3.4.1.2	Integer32	RO	

- ofauLaserAlarmEntry : List of OFAU Laser Alarm.

- ofauLaserAlarmLDBias : OFAU LD Bias Alarm

- ofauLaserAlarmLDTemp : OFAU LD Temp Alarm

5.2.6   Trap

33

In SNMP, SNMP Manager (console) first request data and then SNMP Agent (Shelf-OFA) response with requested data. When an alarm occurs, SNMP Trap containing the alarm information, created by SNMP Agent, is sent to SNMP Manager without request from the recipient. SNMP Manager should be prepared with SNMP Trap Receiver for this feature.

OID : 1.3.6.1.4.1.25454.51.1	
Name	OID
unitCardAct	4.1
failCardAlarm	4.2
mpuVccLow	4.3
mpuVccHigh	4.4

- unitCardAct: Trap information for Status of CARD in each slot.

Value	Information
0	Removed
1	Inserted

- failCardAlarm: Trap information for alarm status of each CARD.

Value	Information
0	Alarm on
1	Alarm off

- mpuVccLow : Trap for Vcc voltage lower than mpuVccLowSet.

Value	Information
0	Alarm off
1	Alarm on

- mpuVccHigh : Trap for Vcc voltage lower than mpuVccHighSet.

Value	Information
0	Alarm off
1	Alarm on

DKT COMEGA

6   PERFORMANCE CHECK

6.1   Precautions for Testing

In this chapter after completing installation of the Shelf Type EDFA the proper operation, power supply procedures, monitor connection, start test method, and other instructions are explained.   Before applying power to the Shelf Type EDFA check the Optical cable connections on the rear panel of the EDFA once more before turning the Power Switch on.

6.2   Power Supply

Below shows the circumstances that occur when the Shelf Type EDFA is first powered up.

- Check if the Power Switch on the front panel is in the OFF state.
- Connect power to the related power sockets on the rear panel.
- Turn on the Power Switch on the front panel.
- The green LED of the Power Switch turns on.
- All the LEDs on the front panel turn on.
- The LCD on the front panel shows the Start state.
- When the Start state of LCD ends, all the LEDs on the front panel turn off and the Alarm Signals are activated normally.   If the EDFA is installed, the related ACT LED turns on.
- If the optical input power is normal, the EDFA stays in the "Laser ON" state.

6.3   Primary Test

6.3.1   Required Measuring Instruments

The required measuring instruments and their performances for the Primary Operation of the EDFA are in Table 10.

Table 7 The Instrument for measuring the performance

Instrument	Performance
Optical Source or Optical Transmitter	Input Optical Signal Source to the EDFA Operational wavelength 1550nm substitution
Optical Variable Attenuator	Controls the optical input power
Optical Power Meter	Measure the optical power

6.3.2   Performance Test

- Precaution

Before this test you must insure the conditions below are met.

1) You must always keep clean the surface of the optical connectors.

2) You must not look directly into the optical connector.

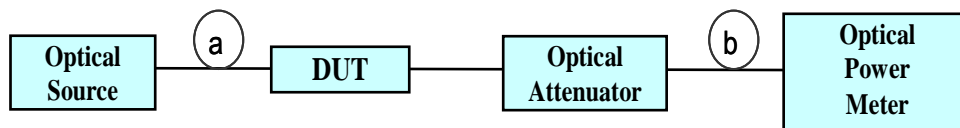3) You must not wipe the surface of the optical connector during the LASER ON state of the EDFA.

Figure 4. Shelf Type EDFA Measuring Instrument Setup

■ Test procedure of the Shelf Type EDFA

1) Connect the measuring instrument in Figure 4.

2) Check the optical signal power from the optical source ⓐ by using the optical power meter. The optical signal power from the optical source must be above the minimum optical input power of EDFA. The minimum optical input power and operating wavelength referred to the TEST REPORT.

3) Next make sure to check the input power range of the optical power meter. The EDFA optical output power is very high, the optical power meter may be heavily damaged if not properly adjusted.

4) Connect the output adapter of the EDFA to the optical power meter through the optical jumper cord.

5) If the optical power meter is unable to measure the optical output power of the EDFA directly you must use the optical attenuator.

6) Under normal operating conditions, that is, LASER ON state, and the optical input power condition is within the optical input power range of the EDFA, check the optical output power of the EDFA (ⓑ).

6.4 Alarm Test

The LOS Alarm of the Shelf Type EDFA occurs when the optical input power of the EDFA is lower than the minimum optical input power condition (see the TEST REPORT).

If you want to check the LOS Alarm, tune the input power of the EDFA by using the optical variable attenuator to a value below optical input signal minimum.

When the LOS Alarm is activated the related LOS LED on the front panel turns on.

At this time the Shelf Type EDFA automatically changes to the Laser Shutdown state and the LOS Alarm is also activated.

The state information value of the Shelf Type EDFA stores both the occurred events and the time they happened.

If the Buzzer selection in the LCD menu is in the ON state, the Buzzer sound goes beep.

The Buzzer sound can be eliminated by pushing the any switch on the front panel or by selecting the correct condition within the Buzzer ON/OFF menu of the LCD menus.

If the Buzzer selection in the LCD menu is in the OFF state the Buzzer sound does not sound and just the state information and time values are stored. When the optical input

36

power of the Shelf Type EDFA is normal, the LED on the front panel and the Buzzer sound automatically turn off. In this case the state information also is automatically stored.

7 MAINTENANCE

7.1 Maintenance Cautions

If the Shelf type EDFA is out of order, a specialized expert must check the EDFA and the problem.

The expert should try to resolve the problem using the technical information provided.

The expert should follow the steps below which may fix the problem or recover the operational state.

Any other repair attempts except those explained in this chapter may cause unexpected damage or problems to the unit or installation.

Careful treatment and caution is required for all trouble shooting procedures.

7.2 Trouble Shooting Procedures

When an operator recognizes any problem on the EDFA front panel he/she should try to identify the type of problem.

When the problems occur the symptoms are shown below in Table 11.

Table 8 In the cases alarm events and Alarm LEDs signs

Case	ACT	LOS	LOP	BIAS	TEMP	SPECIFICS
1						The EDFA is improperly installed.
2	●	●	●			The optical input power of the EDFA does not meet the minimum requirement.
3	●		●			The optical output power of the EDFA does not meet the specified output power.
4	●		●	●		The bias current of the Pump Laser Diode of the EDFA is abnormal.
5	●		●		●	The internal temperature of the Pump Laser Diode of the EDFA is abnormal.

- Case 1: Check the installation of the EDFA cassette in the rear panel and inspect the ACT/DEACT state of the Provision menu.

- Case 2: Measure whether the optical input power of the EDFA from the optical source or optical transmitter satisfies the minimum optical input power condition of the EDFA. If the optical input power of the EDFA is satisfied, clean the surface of the optical input connector of the EDFA. Remember the earlier requirement of clean optical connectors.

- Case 3: Check the Laser ON/OFF state on the Laser Control menu.

- Case 4: In this case either the capability of the Pump Laser Diode degraded or it is out of order. The EDFA needs to be repaired or replaced.

- Case 5: The internal temperature of the Pump Laser Diode is abnormal. It requires either adjustment or replacement.

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If you identify the problems as shown in Table 11 or have an unidentified problem, you must stop operating the EDFA immediately. Contact the DKTCOMEGA to take care of the problem or trouble.

7.3 Repair Procedure

It is prohibited that an operator tries to repair the EDFA on his/her own.

Any broken EDFA should be kept in a proper environment which satisfies the storage conditions. For a broken EDFA you must contact DKTCOMEGA. for repair (Visit www.dktcomega.dk for our phone number and address). If the EDFA is still within the warranty period, the repairs are free of charge. After the warranty period all repair services will be charged to the customer.

Any broken EDFA will be repaired with precise repair procedures and returned to the customer.

For additional information, contact your local DKTCOMEGA sales manager or one of the following:

INTERNET : **http://www.dktcomega.dk**

E-Mail : **dkt@dkt.dk**

Telephone Number : **+45-4646-2626**

Fax Number : **+45-4646-2625**

Address : Fanoevej 6, 4060 Kirke Saaby, Denmark

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